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10/561,361	12/19/2005	Jill MacDonald Boyce	PU030180	9742

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EXAMINER	
ROBERTS, JESSICA M	

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2621	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/561,361	BOYCE ET AL.	
	Examiner	Art Unit	
	JESSICA ROBERTS	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 7/21/2008.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1 and 3-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,3-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 08/07/2008.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Status of the Claims

Claims 1,3-22 are currently pending in Application 10/561,361. Claim 2 has been cancelled by Applicants amendment.

Acknowledgment of Amendments

Applicants amendments filed on 07/18/2008 overcome the following objection(s)/rejection(s):

The rejection of claims 2 and 5 under 35 USC § 112 has been withdrawn in view Applicants amendment.

The rejection of claim 13 under 35 U.S.C. §101 for being directed to non-statutory subject matter has been withdrawn in view of Applicants amendment.

Response to Applicants Arguments

1. Applicant's arguments filed 07/21/2008 have been fully considered but they are not persuasive.

As to Applicants argument regarding the "open loop rate control 202" discussed at column 7line 50 et are clearly not related to the "iterative loop for selecting one of a plurality of quantization parameter values”, and in fact could arguably be said to teach away from the present principles.

The Examiner respectfully disagrees. Wang discloses in accordance with the present inventions, a primary open loop rate control selects an optimized quantization parameter Q by determining a desired size for an individual frame, column 4 line 14-30, which reads upon the claimed limitation.

As to Applicants argument regarding the adjustment of the Q value is does not anticipate the concept of selecting one of a plurality of quantization parameter values for each picture, as recited in claim 1.

The Examiner respectfully disagrees. Wang discloses where in accordance with the present invention, a primary open loop rate control selects the optimized quantization parameter Q by determining a desired size for an individual frame, column 4 line . Therefore, it is clear that the open rate loop control selects the optimized quantization parameter.

As to Applicants argument regarding there is no teaching or suggestion in Boice et al. that remotely discuss "pre-encoding means for pre-encoding the sequence of pictures for *each of a plurality of quantization parameter values*...[emphasis added].

The Examiner respectfully disagrees. Boice discloses where fig. 8 is a generalized flow diagram pursuant to the present invention, where in a sequence of video data is input to subsystem 1, which produces information on scene change, picture quality, bits used, picture type and/or target bit rate. This information is forwarded to controlling processor (CP) 520, which in this example provides a quantization parameter (Mquant) to the second encoding subsystem E2, 540, column 4 line 34-42. Further disclosed is the statistical measures can describe different characteristics of an image frame, for example, busyness of a frame, motion between image frames, scene change or fading, etc. Using the calculated statistics, adaptive encoding of the video sequence is then carried out by controlling one or more encoding

parameters of the real-time encoding process. For example, bit allocation, quantization parameter(s), encoding mode, etc., can be changed from frame to frame or macroblock to macroblock within a given frame according to derived statistics of a characteristic (e.g., scene content) of the particular frame(s). Therefore, it is clear to the Examiner, that Boice discloses to pre-encode and generate the quantization parameters (Encoder #1 and controlling processor (CP)) for a video sequence and encoding the video sequence using the quantization parameters from the pre-encoding, which reads upon the claimed limitation.

As to Applicants argument regarding at best, Boice et al. teaches that one of calculated statistics could include a quantization parameter, but even this teaching (taken singly or in combination with Wang et al) fails to suggest the pre-encoding the sequence of picture for each of a plurality of quantization parameter values.

The Examiner respectfully disagrees. Please see the discussion above.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1, 3-22 are rejected under 35 U.S.C 103(a) as being unpatentable over Wang et al., US 6,118,817 in view of Boice et al., 5,978,029 as applied to claim 1 above and further in view of Wu et al., US 7,016,337.

5. Regarding claim 1, Wang teaches an encoder (fig. 1) for encoding a sequence of pictures as a plurality of block transform coefficients (direct cosine transformation (DCT) on the motion-compensated macroblocks of the motion-compensated frame to produce a transformed frame, column 6 line 56-59 and fig. 1) to meet network traffic model restrictions (motion video signal encoder maximizes image quality without exceeding transmission bandwidth available, See abstract), the encoder comprising an iterative loop for selecting one of a plurality of quantization parameter values for each picture (a primary open rate loop control selects an optimized quantization parameter Q by determining a desired size for an individual frame, column 4 line 14-16. Furthermore, the examiner takes the position that a loop is a reiteration of a set of instructions in a routine or program), said iterative loop comprises: selecting means for selecting each picture of the sequence one of the plurality of quantization parameter values responsive

to the quantization parameter values and bitrate operating points of the neighboring pictures in a predetermined time window. However, Wang is silent in regards to a pre-encoding means for pre-encoding the sequence of pictures for each of a plurality of quantization parameter values; encoding means for encoding each picture the sequence using the quantization parameter value selected for that picture.

6. However, Boice teaches a pre-encoding means for pre-encoding the sequence of pictures for each of a plurality of quantization parameter values (Using the calculated statistics, adaptive encoding of the video sequence is then carried out by controlling one or more encoding parameters of the real-time process. For example, bit allocation, quantization parameter(s), encoding mode, etc., can be changed from frame to frame or macroblock to macroblock within a given frame according to derived statistics of a characteristic (e.g., scene content) of the particular frame(s), column 7 line 30-39. Further disclosed, is encoder subsystem E1 is programmed to generate the desired statistics, which are important to the encoding subsystem's (E2) specific bit rate control algorithm, column 7 line 50-52 and column 8 line 1-5. Therefore, it is clear to the Examiner that encoder #1 (E1) and controlling processor combined allow for pre-encoding; and the; encoding means for encoding each picture the sequence using the quantization parameter value selected for that picture (Boice teaches the statistical processing is accomplished within a processor coupled between the first and second encoder and to develop encoding parameters for the second encoder. The second encoder then uses the enhanced encoding parameters to provide high quality and highly compressed video stream, column 4 line 29-35, fig. 7-8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of Wang with the technique of Boice for enhancing picture quality of an encoded video sequence while still obtaining a high compression rate by providing a real-time VBR a video encoding scheme.

Wang (modified by Boice) is silent in regards to <u>predetermined time window</u> technique, however Wu teaches where an encoder employs a “look a-head window” that is used to determine at what rate each channel must be sent. The “look a-head window” is used with the statistical re-multiplexer to determine to send out a number of bits corresponding to a time T for each of the channels, column 13 lines 65-67 and column 14 lines 1-20 and fig. 11.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of both Wang and Boice with the technique of Wu for providing a system that ensures that the bit rate of transmission matches the channel capacity.

7. Regarding claim 3, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1. In addition, Wang teaches An encoder (Wang, fig. 1) as defined in claim 2 wherein the quantization parameter value selected for <u>the time</u> window encodes a window's worth of pictures at about a target picture rate (Wang discloses the use of a frame rate controller **120** to control the frame rate of the encoded video signal, column 15 line 18-20). Further disclosed by Wang is that the frame rate controller compares the cumulative bandwidth balance to a maximum threshold which is periodically adjusted by frame rate controller and depends upon the

current frame rate at which video signal encoder is encoding frames, column 15 line 28-36. Therefore, it is clear to the examiner since the frame rate controller has both a maximum and minimum threshold value for the encoder to use while encoding video frames, would be a functional equivalent of the time window for flow control for the transformation of data, which reads upon the claimed limitation).

8. Regarding claim 4, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1. Wang is silent in regards to an encoder as defined in claim 1 wherein the quantization parameter value selected for the time window encodes a window's worth of pictures at about a target bitrate (Boice teaches where the controlling processor provides quantization parameters to the second subsystem, and E1 (the first subsystem) provides this into E2 (the second subsystem), where E1 produces information on scene change, quality, bits used and target bit rate, column 4 line 34-43). Therefore, It is clear to the examiner that the subsystem as disclosed by Boice would be capable of providing the target bit rate for the sliding window as disclosed by Wu to allow for encoding of a windows worth of pictures.

9. However, Boice teaches wherein the quantization parameter value selected for the time window encodes a window's worth of pictures at about a target bitrate (Boice teaches where the controlling processor provides quantization parameters to the second subsystem, and E1 (the first subsystem) provides this into E2 (the second subsystem), where E1 produces information on scene change, quality, bits used and target bit rate, column 4 line 34-43). Therefore, It is clear to the examiner that the subsystem as disclosed by Boice would be capable of providing the target bit rate for

the sliding window as disclosed by Wu to allow for encoding of a windows worth of pictures.

10. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Boice with Wang (modified by Wu) for enhancing picture quality of an encoded video sequence while still obtaining a high compression rate.

11. Regarding claim 5, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1. Wang is silent in regards to An encoder as defined in claim 1 wherein the quantization parameter values selected for each picture in the video sequence and for the neighboring pictures in the same time window as the given picture are chosen to encode the pictures to be transmitted within a time window of preset duration to be encoded within a target number of bits.

12. However, Wu discloses where the second output of the video scene analyzer is coupled to the input of the compressor. The second output provides the video data and relevant timing information so that it can be used by the compressor to provide a bit stream at a desired target bit rate, column 9 lines 25-31). Further disclosed by Wu is the use of a scheduler with the multiplexer to provide an output bit stream at a given rate (see abstract, column 13 lines 43-45 and fig. 10).

13. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Wu with Wang (modified by Boice) for providing a system that ensures that the bit rate of transmission matches the channel capacity.

14. Regarding claim 6, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1. Wang is silent in regards to an encoder as defined in claim 1 wherein the sequence of video pictures comprises a group of pictures.

15. However, Boice teaches wherein the sequence of video pictures comprises a group of pictures (Boice, GOP, column 8 line 11).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of Wang with the technique of Boice for enhancing picture quality of an encoded video sequence while still obtaining a high compression rate by providing a real-time VBR a video encoding scheme.

16. Regarding claim 7, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1. Wang is silent in regards to wherein the sequence of video pictures comprises pre-stored video content.

17. However, Boice teaches wherein the sequence of video pictures comprises pre-stored video content. (Boice, the input pictures must be temporarily stored until used for encoding, column 6 line 3-5).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of Wang with the technique of Boice for enhancing picture quality of an encoded video sequence while still obtaining a high compression rate by providing a real-time VBR a video encoding scheme.

18. Regarding claim 8, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1. Wang is silent in regards to an encoder as

defined in claim 1 wherein a portion of sequence of video pictures to be transmitted within preset time duration meets a network traffic model restricting the number of bits to be transmitted within the preset time duration.

19. However, Wu teaches wherein a portion of sequence of video pictures to be transmitted within preset time duration meets a network traffic model restricting the number of bits to be transmitted within the preset time duration (Wu discloses where the look-ahead window is used with the statistical re-multiplexer may decide to send out number of bits corresponding to a time T1 for each of the channels, where T1 may be less than or equal to T. For the case T1<T, the statistical re-multiplexer 504 examines the input bit streams from all different programs in an interval T, and only sends out T, part of the data. In the next iteration, the statistical re-multiplexer 504 examines the data after T.sub.1, and the examining data period still uses a time window size of T, column 14 lines 3-18). Therefore, it is clear to examiner that by limiting and sending out just part of the data within a set time window size would restrict the data to meet network traffic, which reads upon the claimed limitation.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching Wang (modified by Boice) with the technique of Wu for providing a system that ensures that the bit rate of transmission matches the channel capacity.

20. Regarding claim 9,Wang (modified by Boice and Wu) as whole teaches everything as claimed above, see claim 1. In addition, Wang teaches an encoder (Wang, fig. 1) as defined in claim 1 wherein the selecting means for selecting one of

the plurality of quantization parameter values for each picture of the video sequence (Wang, primary open loop rate control, column 4 line 14-30) to optimize the quantization parameter value selected to encode each picture (Wang, If the cumulative bandwidth balance deviates from a predetermined range, quantization is adjusted as needed to either improve image quality to more completely consume available bandwidth or to reduce image quality to thereby consume less bandwidth, See abstract). Wang is silent in regards to comprises multi-pass encoding means.

21. However, Boice teaches multi-pass encoding means (Boice, fig. 5 and 7).

22. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Boice with Wang (modified by Wu) for enhancing picture quality of an encoded video sequence while still obtaining a high compression rate.

23. Regarding claim 10, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1.Wang is silent in regards to an encoder as defined in claim 1 wherein the pre-encoding (Boice, encoder subsystem 1 (E1), fig. 5 and 7) means for pre-encoding the sequence of pictures for each of the plurality of quantization parameter values comprises means for re-using motion vector values (Boice discloses during a first pass of encoding, i.e., via subsystem E1, motion statistics based on motion vectors are calculated by encoding engine 410. Encoding subsystem E2 then outputs an encoded bitstream using a second pass through encoding engine 410, column 8 lines 39-44). Furthermore, the examiner takes the position since the motion vectors are used to calculate the motion statistics and then output to encoding

subsystem 2, this would necessitate that the motion vectors are being used more than one, or re-used. Further, it would be inherent that the motion vectors are re-used during the encoding and decoding process. The motion vectors that are obtained from the motion estimator would be the same motion vectors that are used in the motion compensator until a scene change is detected.

24. However, Boice teaches wherein the pre-encoding (Boice, encoder subsystem 1 (E1), fig. 5 and 7) means for pre-encoding the sequence of pictures for each of the plurality of quantization parameter values comprises means for re-using motion vector values (Boice discloses during a first pass of encoding, i.e., via subsystem E1, motion statistics based on motion vectors are calculated by encoding engine 410. Encoding subsystem E2 then outputs an encoded bitstream using a second pass through encoding engine 410, column 8 lines 39-44). Furthermore, the examiner takes the position since the motion vectors are used to calculate the motion statistics and then output to encoding subsystem 2, this would necessitate that the motion vectors are being used more than one, or re-used. Further, it would be inherent that the motion vectors are re-used during the encoding and decoding process. The motion vectors that are obtained from the motion estimator would be the same motion vectors that are used in the motion compensator until a scene change is detected.

25. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Boice with Wang (modified by Wu) for enhancing picture quality of an encoded video sequence while still obtaining a high compression rate.

26. Regarding claim 11, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1. In addition Wang teaches an encoder (Wang, fig. 1) as defined in claim 1 in combination with a decoder (Wang, fig. 11) for decoding encoded block transform coefficients (Wang, inverse discrete cosine transform, fig. 1) that meet network traffic model restrictions to provide reconstructed pixel data (Wang, frame reconstructor, fig. 1. It is clear to the examiner that in order to reconstruct the frame, it would be necessary for have reconstructed pixel data to comprise the reconstructed frame). Wang is silent in regards to the decoder comprising a variable length decoder (Wu, VLC decoding, fig. 2) for decoding video data corresponding to a time window having a preset duration according to a network traffic model (Wu, discloses where the video data is encoded according to preset time duration, column 14 lines 3-18. The examiner takes the position that if the video data is encoded with respect to a preset time duration, it would also be decoded according to a preset time duration.)

27. However, Wu teaches the decoder comprising a variable length decoder (Wu, VLC decoding, fig. 2) for decoding video data corresponding to a time window having a preset duration according to a network traffic model (Wu, discloses where the video data is encoded according to preset time duration, column 14 lines 3-18. Therefore, it is clear to the examiner that since the video data is encoded with respect to a preset time duration, it would also be decoded according to a preset time duration, which reads upon the claimed limitation).

28. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Wu with Boice (modified by Wang) for Wu for providing a system that ensures that the bit rate of transmission matches the channel capacity.

29. Regarding claim 12, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 1. In addition, Wang teaches a codec (Wang, fig. 1) comprising an encoder (Wang, fig. 1) as defined in claim 1, and a decoder for decoding encoded block transform coefficients (Wang, inverse DCT, fig. 1) that meet network traffic model restrictions to provide reconstructed pixel data (Wang, frame reconsructor, fig. 1. It is clear to the examiner that in order to reconstruct the frame, it would be necessary for have reconstructed pixel data to comprise the reconstructed frame.). Wang is silent in regards to the decoder comprising a variable length decoder (Wu, VLC decoding, fig. 2) for decoding video data corresponding to a decoder time window having a preset duration according to a network traffic model (Wu, discloses where the video data is encoded according to preset time duration, column 14 lines 3-18. The examiner takes the position that if the video data is encoded with respect to a preset time duration, it would also be decoded according to a preset time duration.) pre-encoding the sequence of pictures for each of a plurality of quantization parameter values (Boice , using the calculated statistics, adaptive encoding of the video sequence is then carried out by controlling one of more encoding parameters of the real-time process. For example, bit allocation, quantization parameter(s), encoding mode, etc., can be changed from frame to frame or marcroblock to macroblock within a given frame

according to derived statistics of a characteristic (e.g., scene content) of the particular frame(s), column 7 lines 30-39. Further disclosed, is encoder subsystem E1 is programmed to generate the desired statistics, which are important to the encoding subsystem's (E2) specific bit rate control algorithm, column 7 line 50-52 and column 8 line 1-5 The examiner takes the position that encoder #1 (E1) and controlling processor combined allow for pre-encoding; and the quantization(s) would be an important statistic needed for encoding subsystem E2 specific bit rate control algorithm); selecting for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in the sliding time window (Wang teaches where a primary open loop rate control selects an optimized quantization parameter Q, by determining a desired size for an individual frame and comparing the size of the frame as encoded to the desired frame. Wang also discloses where if the frame size is greater than the desired size, quantization parameter Q is increased to reduce the size of the subsequently encoded frames to consume less bandwidth; and if the encoded frame size is less than the desired size, quantization parameter Q is reduced to increase the size of the subsequently encoded frame to fully consume available bandwidth. Further, Wang teaches where each frame is encoded in a manner which maximizes image quality while approaching full consumption of available bandwidth and guarding against exceeding available bandwidth, column 4 lines 14-30. The examiner takes the position that the encoded video would be encoded to the response of the selected quantization parameters since the video is encoded depending on the adjusted quantization

parameter Q); and encoding each picture of the sequence using the quantization parameter value selected for that picture (Boice teaches the statistical processing is accomplished within a processor couple between the first and second encoder and to develop encoding parameters for the second encoder. The second encoder then uses the enhanced encoding parameters to provide high quality and highly compressed video stream, column 3 line 29-35, and fig. 7 and 8).

30. Regarding claim 13, the analysis and rejection made in claims 1-12 also apply here. Wang (modified by Boice and Wu) as a whole teaches a processor-based system. Hence a computer program for executing the necessary steps corresponding to the apparatus of claim 1 would have been inherent.

31. Regarding claims 14-22, the rejection and analysis made in claims 1-12 also apply. Claims 14-22 which recite a method for the corresponding apparatus would necessarily perform the method steps of claims 14-22.

32. In further regards to claim 14, Wang teaches a method of performing video rate control on a sequence of pictures to meet network traffic model restrictions, the method comprising: selecting for each picture of the sequence one of the plurality of quantization parameter values responsive to the quantization parameter values and bitrate operating points of the neighboring pictures in the sliding time window (Wang teaches where a primary open loop rate control selects an optimized quantization parameter Q, by determining a desired size for an individual frame and comparing the size of the frame as encoded to the desired frame. Wang also discloses where if the frame size is greater than the desired size, quantization parameter Q is increased to

reduce the size of the subsequently encoded frames to consume less bandwidth; and if the encoded frame size is less than the desired size, quantization parameter Q is reduced to increase the size of the subsequently encoded frame to fully consume available bandwidth. Further, Wang teaches where each frame is encoded in a manner which maximizes image quality while approaching full consumption of available bandwidth and guarding against exceeding available bandwidth, column 4 lines 14-30). The examiner takes the position that the encoded video would be encoded to the response of the selected quantization parameters since the video is encoded depending on the adjusted quantization parameter Q);

Wang is silent in regards to pre-encoding the sequence of pictures for each of a plurality of quantization parameter values; and encoding each picture of the sequence using the quantization parameter value selected for that picture.

However, Boice teaches pre-encoding the sequence of pictures for each of a plurality of quantization parameter values (Using the calculated statistics, adaptive encoding of the video sequence is then carried out by controlling one of more encoding parameters of the real-time process. For example, bit allocation, quantization parameter(s), encoding mode, etc., can be changed from frame to frame or marcroblock to macroblock within a given frame according to derived statistics of a characteristic (e.g., scene content) of the particular frame(s), column 7 lines 30-39 . Further disclosed, is encoder subsystem E1 is programmed to generate the desired statistics, which are important to the encoding subsystem's (E2) specific bit rate control algorithm, column 7 line 50-52 and column 8 line 1-5 The examiner takes the position that

encoder #1 (E1) and controlling processor combined allow for pre-encoding; and the quantization(s) would be an important statistic needed for encoding subsystem E2 specific bit rate control algorithm. Boice further teaches and pre-encoding means for encoding each picture of the sequence using the quantization parameter value selected for that picture (Boice teaches the statistical processing is accomplished within a processor couple between the first and second encoder and to develop encoding parameters for the second encoder. The second encoder then uses the enhanced encoding parameters to provide high quality and highly compressed video stream, column 3 line 29-35, and fig. 7 and 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of Wang with the technique of Boice for enhancing picture quality of an encoded video sequence while still obtaining a high compression rate by providing a real-time VBR a video encoding scheme.

Both Wang and Boice are silent in regards to a <u>predetermined time window</u>, however Wu et al., US 7,016,337 teaches where an encoder employs a “look a-head window” that is used to determine at what rate each channel must be sent. The “look a-head window” is used with the statistical re-multiplexer to determine to send out a number of bits corresponding to a time T for each of the channels, column 13 lines 65-67 and column 14 lines 1-20 and fig. 11.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of both Wang and Boice with the

technique of Wu for providing system that ensures that the bit rate of transmission matches the channel capacity.

33. Regarding claim 15, Wang (modified by Boice and Wu) as a whole teaches everything as claimed above, see claim 14. Wang is silent in regards to a method as defined in claim 14 wherein the sequence of pictures comprises a sequence of video frames.

34. However, Boice teaches wherein the sequence of pictures comprises a sequence of video frames (Boice, video encoder is constructed to be adaptive to the video data received as a sequence of frames, column 7 line 20-23).

35. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Boice with Wang (modified by Wu) for providing enhancing picture quality of an encoded video sequence while still obtaining a high compression rate.

36. Regarding claim 16, see rejection for claim 4.

37. Regarding claim 17, see rejection for claim 5.

38. Regarding claim 18, see rejection for claim 6.

39. Regarding claim 19, see rejection for claim 7.

40. Regarding claim 20, see rejection for claim 8.

41. Regarding claim 21, see rejection for claim 9.

42. Regarding claim 22, see rejection for claim 10.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA ROBERTS whose telephone number is (571)270-1821. The examiner can normally be reached on 7:30-5:00 EST Monday-Friday, Alt Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-79057418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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